On the Method of determining, from the real Probabilities of Life, the Values of Contingent Reversions in which three Lives are involved in the Survivorship. *By* William Morgan, *Esq. F.R.S.* Read Dec. 12, 1799. [*Phil. Trans.* 1800, *p.* 22.]

Mr. Morgan having already communicated to the Society the solutions of seventeen different problems in the doctrine of contingent reversions depending upon three lives, has been induced, from a wish to complete the subject, to investigate in the present paper seven more problems in which the same number of lives are concerned in the survivorship. These, he tells us, include, as far as he can perceive, all the remaining cases involving those complicated contingencies.

In examining the investigation of these problems, it appears that the determination of the reversion in some of them depends in each year on the happening of twelve or thirteen different events. These numerous contingencies being all expressed by separate fractions (each of which is resolved into two or more different series) renders the operations exceedingly intricate and laborious. From an apprehension, it seems, of becoming tedious and diffusive in his demonstrations, the author has in general contented himself with merely giving the fractions denoting the contingencies on which the reversion depends, without specifying in words at length the nature of those contingencies. He has, however, in these as in all the other problems he has investigated, given different demonstrations, both by solving each independent of any other problem, and by deriving the solution from those of two or more problems, which had been already investigated; so that from the exact agreement in the results, proofs are deduced of the perfect accuracy of the demonstration, not only of the problem investigated, but also of those which are applied to the solution.

In all these problems, a contingency is involved, which having never been accurately determined. had hitherto rendered even an approximation to the solution of them impossible. This contingency is that of *one life's failing* after another in a given time. This appears to have been ascertained with sufficient accuracy to enable the author to surmount a difficulty in the solution of these problems, which he owns he had once considered as insuperable.

Having thus accomplished the investigation of every case in which he conceives it possible that the contingency may be varied between these lives, he conceives that he has now exhausted the subject; and concludes his paper with observing, that those cases in which four lives are involved in the survivorship are not only too numerous and complicated to admit of solution, but that they occur so seldom in practice as to render the labour of such solution (if it were practicable) both useless and unnecessary.